

Sub 17

I claim:

1. A method for a parent device to access a service of a child device in a driver stack, the method comprising:
 - creating a virtual device;
 - binding the virtual device to the parent device;
 - inserting the virtual device in the driver stack below the child device; and
 - accessing the service of the child device.
2. A method according to claim 1, wherein the driver stack is a dynamic driver stack.
3. A method according to claim 2, wherein accessing the service of the child device includes accessing the service of the child device by the parent device.
4. A method according to claim 2, wherein accessing the service of the child device includes incrementing a reference count of a number of users of the service of the child device.
5. A method according to claim 2, wherein binding the virtual device includes arranging the parent device to receive a query to remove the dynamic driver stack sent to the virtual device.
6. A method according to claim 2, the method further comprising:
 - receiving at the virtual device a query to remove the dynamic driver stack;
 - releasing the service of the child device; and
 - passing the query to remove the dynamic driver stack to a next device in the dynamic driver stack.
7. A method according to claim 6, wherein releasing the service of the child device includes releasing the service of the child device by the parent device.
8. A method according to claim 6, wherein releasing the service of the child device includes invoking a code within the virtual device that accesses the parent device.

1 9. A method according to claim 6, wherein releasing the service of the child
2 device includes decrementing a reference count of a number of users of the service of the
3 child device.

1 10. A method according to claim 2, wherein accessing the service of the child
2 device includes accessing a second service of a second child device above the virtual device
3 in the dynamic driver stack.

1 11. An article comprising:
2 a storage medium, said storage medium having stored thereon instructions, that, when
3 executed by a computing device, result in:
4 creating a virtual device;
5 binding the virtual device to the parent device;
6 inserting the virtual device in a driver stack below the child device; and
7 accessing the service of the child device.

1 12. An article according to claim 11, wherein the driver stack is a dynamic driver
2 stack.

1 13. An article according to claim 12, wherein accessing the service of the child
2 device includes accessing the service of the child device by the parent device.

1 14. An article according to claim 12, wherein accessing the service of the child
2 device includes incrementing a reference count of a number of users of the service of the
3 child device.

1 15. An article according to claim 12, wherein binding the virtual device includes
2 arranging the parent device to receive a query to remove the dynamic driver stack sent to the
3 virtual device.

1 16. An article according to claim 12, the storage medium having stored thereon
2 further instructions that, when executed by the computing device, result in:

1 receiving at the virtual device a query to remove the dynamic driver stack;
2 releasing the service of the child device; and
3 passing the query to remove the dynamic driver stack to a next device in the dynamic
4 driver stack.

1 17. An article according to claim 16, wherein releasing the service of the child
2 device includes releasing the service of the child device by the parent device.

1 18. An article according to claim 16, wherein releasing the service of the child
2 device includes invoking a code within the virtual device that accesses the parent device.

1 19. An article according to claim 16, wherein releasing the service of the child
2 device includes decrementing a reference count of a number of users of the service of the
3 child device.

1 20. An article according to claim 12, wherein accessing the service of the child
2 device includes accessing a second service of a second child device above the virtual device
3 in the dynamic driver stack.

1 21. An apparatus supporting removal of a driver stack, the apparatus comprising:
2 a computer including a hardware component requiring the driver stack;
3 an operating system running on the computer;
4 the driver stack loaded onto the operating system and supporting the hardware
5 component, the driver stack including at least a parent driver and a child driver, the child
6 driver providing a service accessed by the parent driver; and
7 a virtual driver installed below the child driver in the driver stack.

1 22. An apparatus according to claim 21, wherein the operating system is designed
2 to support dynamic removal of the driver stack.

1 23. An apparatus according to claim 22, wherein the virtual driver is adapted to
2 inform the parent driver when the driver stack is to be removed.

1 24. An apparatus according to claim 22, wherein the parent driver is adapted to
2 insert the virtual driver into the driver stack before accessing the service provided by the
3 child driver.

1 25. An apparatus according to claim 22, wherein the child driver includes a
2 reference count of a number of users of the service.

a 1 26. An apparatus according to claim ²⁵26, wherein the parent driver is adapted to
2 increment the reference count of the child driver before accessing the service provided by the
3 child driver.

1 27. An apparatus according to claim 26, wherein the parent driver is adapted to
2 decrement the reference count of the child driver after being informed by the virtual driver
3 that the driver stack is to be removed and stopping use of the service provided by the child
4 driver.